

Metaecosystems – network approaches in population dynamics

Ulrike Feudel

1. Abstract

An ecosystem can be considered as a food web living in a certain region in space (habitat) reflecting specific environmental conditions. Instead of considering continuous space and time leading to models in form of reaction-diffusion systems we look at ecosystems from a large-scale perspective and describe it as a set of different habitats which are interconnected by migration corridors for the dispersal of species among the habitats. This leads to a network description in which each habitat is assigned to a node, while the dispersal of species or migration along the edges of the network is often modelled as proportional to a gradient in abundances between the different habitats similar to diffusion. Such meta-ecosystems can help to understand the role of connectivity between the different habitats for the survival of species. We discuss effects like synchronization and desynchronization of species between habitats and dispersal-induced rescue of species at risk. We show how complex dynamics of species can contribute to the survival of species even in cases in which poor environmental conditions in a habitat would favor extinction.